

CLAIMS

1. A valve timing change apparatus for changing open-close timing of an intake valve or an exhaust valve of an internal combustion engine, by changing the relative angle position in the rotating direction between a cam shaft which drives said valve and a rotational drive member which receives rotational drive force of a crank shaft to rotate said cam shaft, comprising:

an angle change mechanism changing and holding the relative angle position between said cam shaft and said rotational drive member by oil pressure;

an oil pressure generating mechanism generating oil pressure for driving said angle change mechanism by relative rotation; and

a drive means generating relative rotation at said oil pressure generating mechanism.

2. The valve timing change apparatus according to claim 1, wherein said angle change mechanism, said oil pressure generating mechanism, and said drive means are arranged coaxially to said cam shaft.

3. The valve timing change apparatus according to claim 1 or claim 2, wherein the angle position of said cam shaft against said rotational drive member moves in one direction by oil pressure and in the other direction by spring force.

4. The valve timing change apparatus according to any one of claims 1 through 3,

wherein said angle change mechanism has a first rotate member rotating integrally with said rotational drive member and a second rotate member rotating integrally with said cam shaft;

wherein said first rotate member and said second rotate member define an advancing oil chamber and a retarding oil chamber to and from which the operating oil is charged and discharged, to rotate said cam shaft to the advancing

side or the retarding side against said rotational drive member;

wherein said oil pressure generating mechanism has a rotor defining an expansion-compression room of the operating oil while rotating integrally with said first rotate member, and a casing rotatably supported so that said rotor sucks and ejects the operating oil with relative rotation to said casing; and

wherein said drive means has an electromagnetic coil for generating electromagnetic force to exert braking torque to said casing for suppressing rotation.

5. The valve timing change apparatus according to claim 4, wherein said oil pressure generating mechanism has a connecting passage for sucking the operating oil charged into one of said advancing oil chamber and said retarding oil chamber, and ejecting the operating oil towards the other of said advancing oil chamber and said retarding oil chamber.

6. The valve timing change apparatus according to claim 5, wherein said oil pressure generating mechanism is disposed adjacent to said first rotate member, and said connecting passage is formed at said first rotate member.

7. The valve timing change apparatus according to claim 6, wherein said connecting passage comprises a first annular passage and a second annular passage formed approximately coaxially to said cam shaft and respectively connected to a suck port and an eject port of said oil pressure generating mechanism, and a first piercing hole and a second piercing hole respectively connecting said first annular passage and said second annular passage respectively to said retarding oil chamber and said advancing oil chamber.

8. The valve timing change apparatus according to any one of claims 4 through 7, wherein said rotor has an inner rotor directly connected to said first rotate member, and an outer rotor defining the expansion-compression room of

the operating oil with said inner rotor.

9. The valve timing change apparatus according to any one of claims 1 through 8, wherein said angle change mechanism has an oil passage to introduce lubricating oil of an internal combustion engine.